

Claims

1. A supported catalyst system suitable for the polymerisation of olefins comprising

(a) a transition metal compound,

(b) an activator comprising

(i) an aluminoxane or

(ii) a Group IIIA (CAS Version) metal or metalloid compound, and

(c) a support material comprising an inorganic metal oxide, inorganic metal halide or polymeric material or mixtures thereof

characterised in that the support material has been pretreated with a source of a

transition metal atom.

2. A supported catalyst system according to claim 1 wherein the support material is silica.

3. A supported catalyst system according to either of the preceeding claims wherein the transition metal compound is a metallocene.

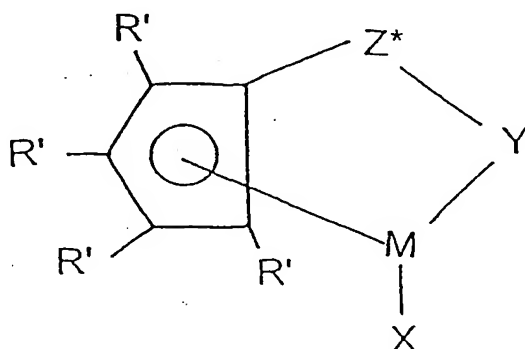
4. A supported catalyst system according to claim 3 wherein the metallocene has the formula:



wherein Cp is a single cyclopentadienyl or substituted cyclopentadienyl group optionally covalently bonded to M through a substituent, M is a Group VIB (CAS Version) metal bound in a η^5 bonding mode to the cyclopentadienyl or substituted cyclopentadienyl group, X each occurrence is hydride or a moiety selected from the

group consisting of halo, alkyl, aryl, aryloxy, alkoxy, alkoxyalkyl, amidoalkyl, siloxyalkyl etc. having up to 20 non-hydrogen atoms and neutral Lewis base ligands having up to 20 non-hydrogen atoms or optionally one X together with Cp forms a metallocycle with M and n is dependent upon the valency of the metal.

5. A supported catalyst system according to claim 3 wherein the metallocene is represented by the general formula:



wherein:-

- R' each occurrence is independently selected from hydrogen, hydrocarbyl, silyl, germyl, halo, cyano, and combinations thereof, said R' having up to 20 nonhydrogen atoms, and optionally, two R' groups (where R' is not hydrogen, halo or cyano) together form a divalent derivative thereof connected to adjacent positions of the cyclopentadienyl ring to form a fused ring structure;

- X is a neutral η^4 bonded diene group having up to 30 non-hydrogen atoms, which forms a π -complex with M;

Y is -O-, -S-, -NR^{*}-, -PR^{*}-,

M is titanium or zirconium in the + 2 formal oxidation state;

Z^{*} is SiR^{*}₂, CR^{*}₂, SiR^{*}₂SIR^{*}₂, CR^{*}₂CR^{*}₂, CR^{*}=CR^{*}, CR^{*}₂SIR^{*}₂, or

GeR^{*}₂, wherein:

- R^{*} each occurrence is independently hydrogen, or a member selected from hydrocarbyl, silyl, halogenated alkyl, halogenated aryl, and combinations thereof, said R^{*} having up to 10 non-hydrogen atoms, and optionally, two R^{*} groups from Z^{*} (when R^{*} is not hydrogen), or an R^{*} group from Z^{*} and an R^{*} group from Y form a ring

system.

6. A supported catalyst system according to any of the preceeding claims wherein the activator may be represented by the formula:



wherein

L^* is a neutral Lewis base

$(L^*-H)^+_d$ is a Bronsted acid

10 A^{d-} is a non-coordinating compatible anion of a Group IIIA (CAS Version) metal or metalloid having a charge of d^- , and d is an integer from 1 to 3.

7. A supported catalyst system according to claim 6 wherein the activator
15 comprises a cation and an anion wherein the anion has at least one substituent comprising a moiety having an active hydrogen.

8. A supported catalyst system according to any of the preceeding claims wherein the activator is a fluorine containing Group IIIA metal or metalloid compound.

9. A supported catalyst system according to any of the preceeding claims wherein
20 the Group IIIA metal of the activator is boron.

10. A supported catalyst system for the polymerisation of olefins comprising
(a) a transition metal compound,
(b) a cocatalyst comprising an organometallic compound, and
(c) a support material comprising an inorganic metal oxide, inorganic metal
25 halide or polymeric material or mixtures thereof
characterised in that the support material has been pretreated with a source of a transition metal atom.

11 A supported catalyst system according to any of the preceeding claims wherein the source of the transition metal atom is a transition metal salt.

30 12. A supported catalyst system according to claim 11 wherein the transition metal is iron or copper.

13. A supported catalyst system according to claim 11 wherein the transition metal salt is ferrous sulphate, cupric sulphate or ferrous D-gluconate.

14. A supported catalyst system according to any of the preceeding claims wherein the transition metal content on the support material is in the range 0.0001 % to 10 %.

15. A process for the polymerisation of olefin monomers selected from (a) ethylene, (b) propylene (c) mixtures of ethylene and propylene and (d) mixtures of (a), (b) or (c)

5 with one or more other alpha-olefins, said process performed under polymerisation conditions in the presence of a supported catalyst system according to any of the preceeding claims.

16. A process for the polymerisation of ethylene or the copolymerisation of ethylene and α -olefins having from 3 to 10 carbon atoms, said process performed under

10 polymerisation conditions in the present of a supported catalyst system according tom claims 1 to 14.

17. A process according to claims 15 or 16 wherein the alpha-olefins are 1-butene, 1-hexene, 4-methyl-1-pentene and 1-octene.

18. A process according to claims 15 to 17 carried out in the gas phase.

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